GEOS-5 Update

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on Behalf of NASA's
Global Modeling and Assimilation Office

EOS-Aura Meeting: Meteorological Products Working Group
September 11, 2006

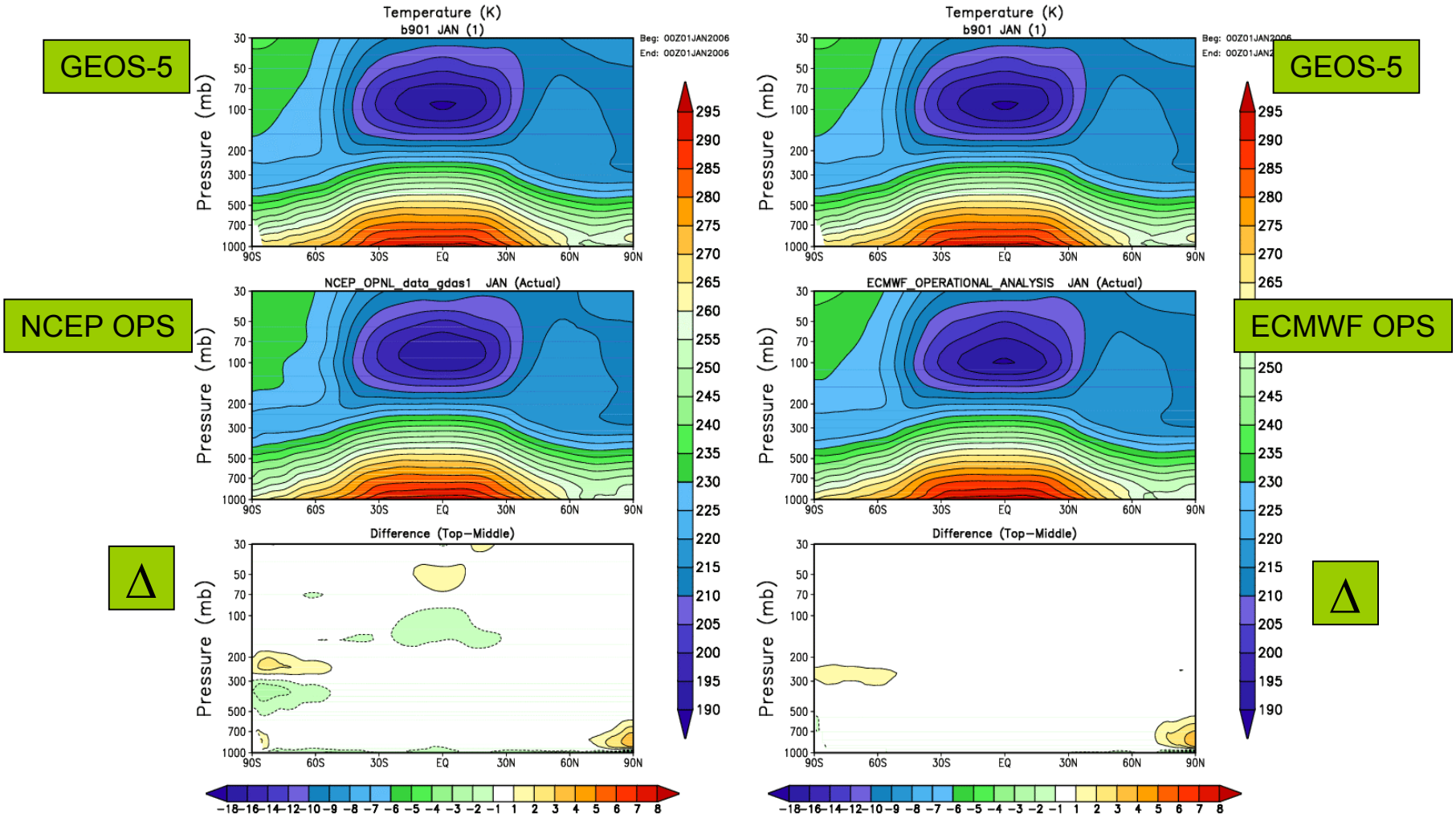
Objectives

- Brief summary
- Some results
- Projected timeline

GEOS-5: Salient Points

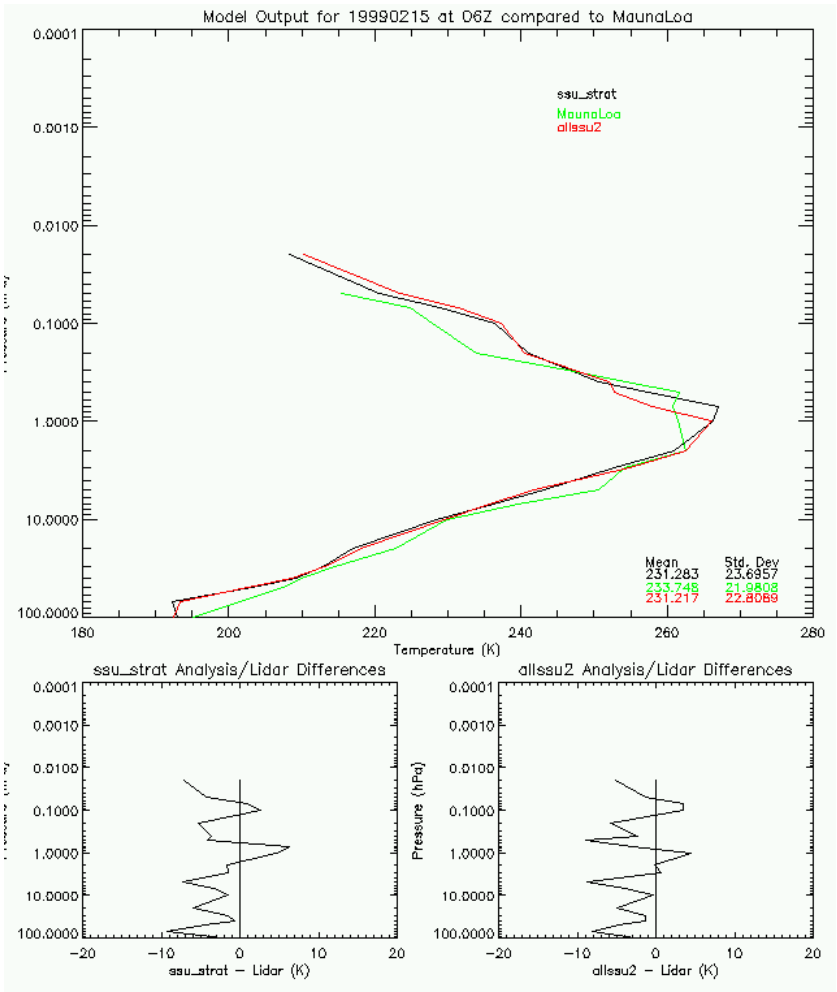
- GCM - best of GEOS-4, GEOS-3, more:
  - Finite-volume (Lin-Rood) dynamical core
  - Moist processes updated from GEOS-3
- Analysis - collaboration with NCEP:
  - 3D-Var (GSI)
  - Radiances from operational sensors
- Assimilation:
  - Incremental Analysis Increments (IAU)

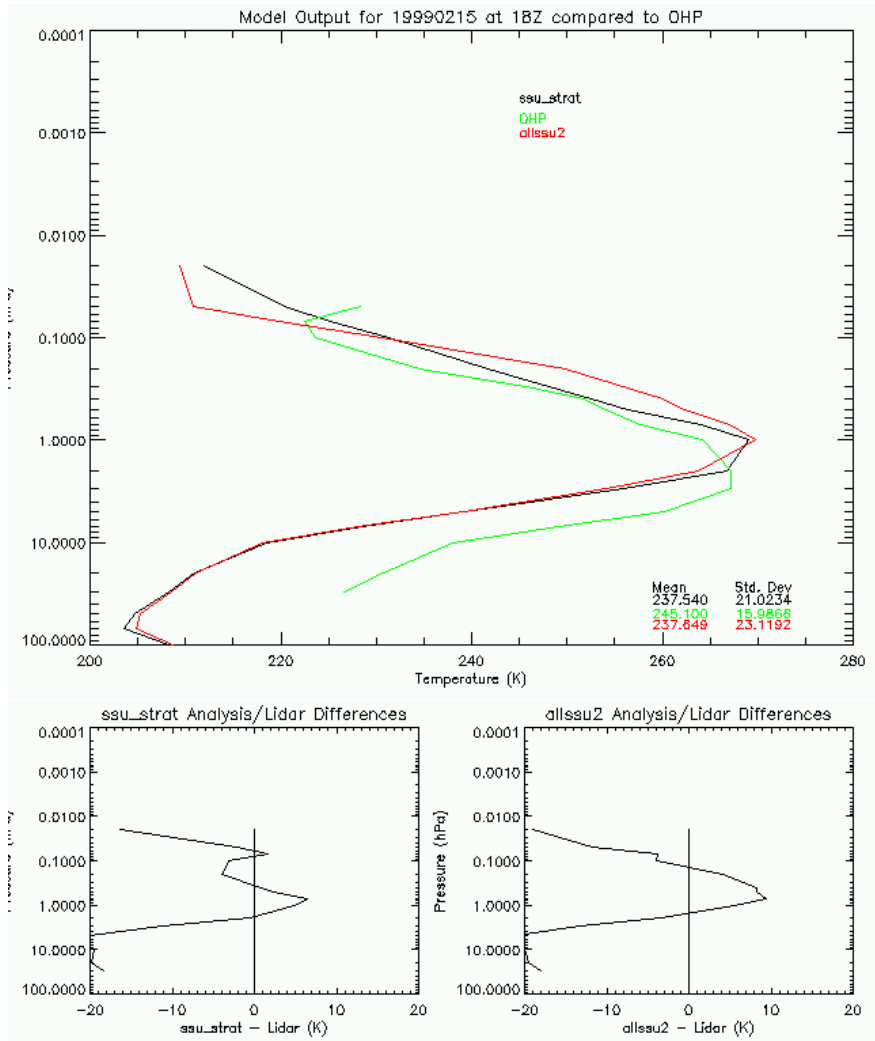
Zonal-mean Temperature



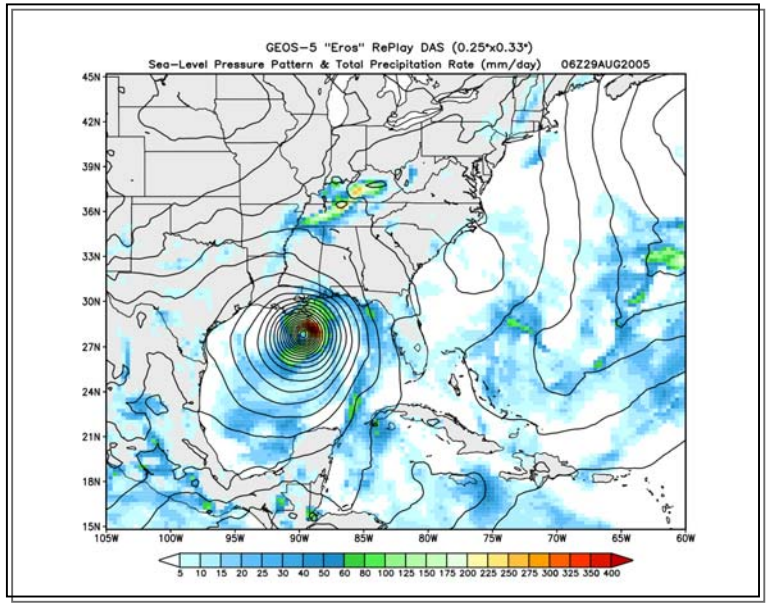
Zonal-mean Temperature for January 2006: comparing a half-degree resolution version of GEOS-5 with NCEP and ECMWF

Comparison with Lidar T





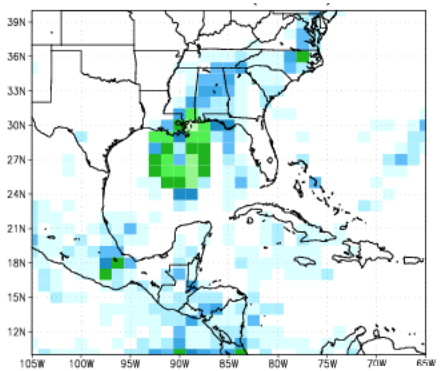
GEOS5 & Katrina: MAP05 vs MAP06



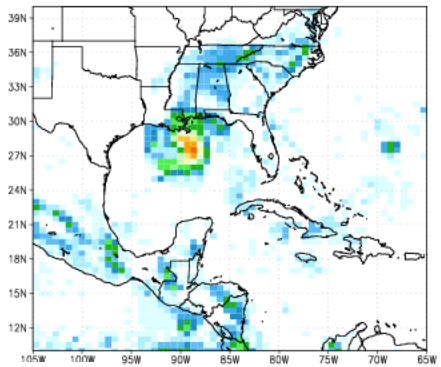
Precipitation Rate

Precipitation Rate (mm/day) (Initialized: 2005 Aug 27, 12z)
00Z29AUG2005

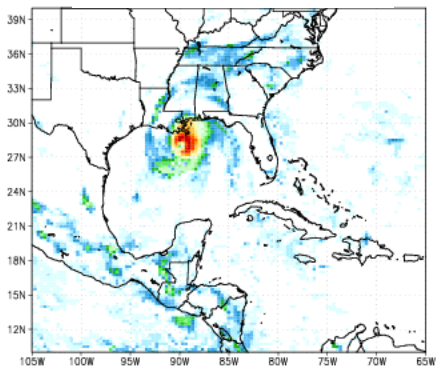
1 degree resolution



0.5 degree resolution



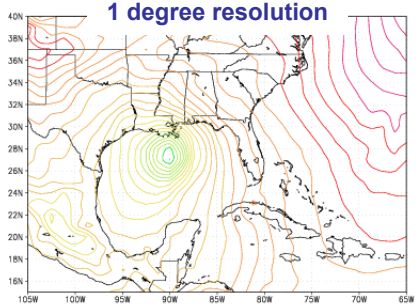
0.25 degree resolution



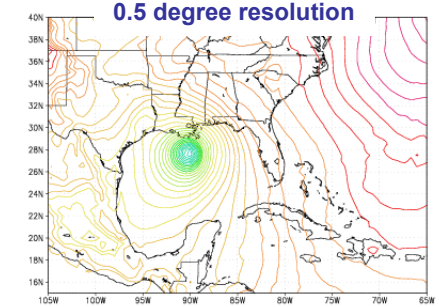
Sea Level Pressure

Sea-Level Pressure (Initialized: 2005 Aug 27, 12z)
00Z29AUG2005

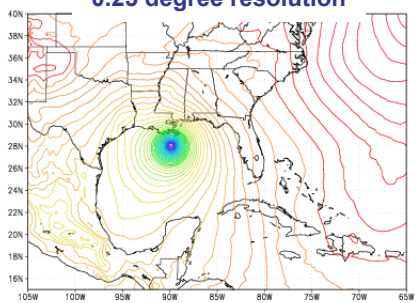
1 degree resolution



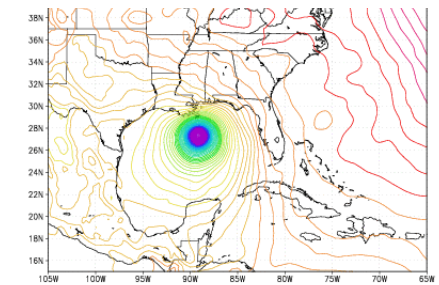
0.5 degree resolution



0.25 degree resolution



Verifying Analysis from NOAA/NCEP



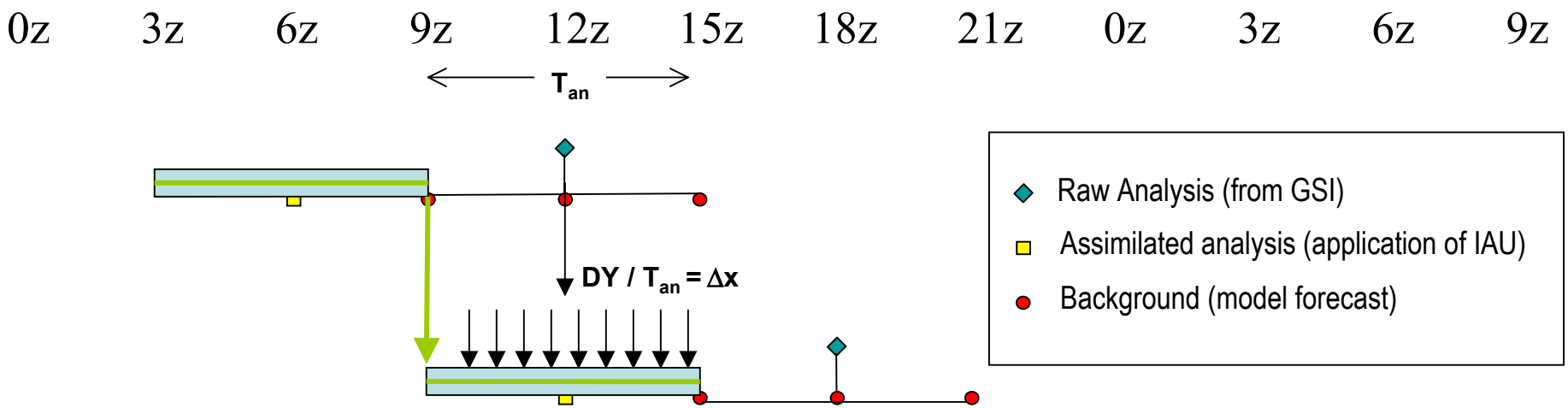
Concept of IAU

$$\partial x / \partial t = dynamics + physics + \Delta x$$

"Observed change"

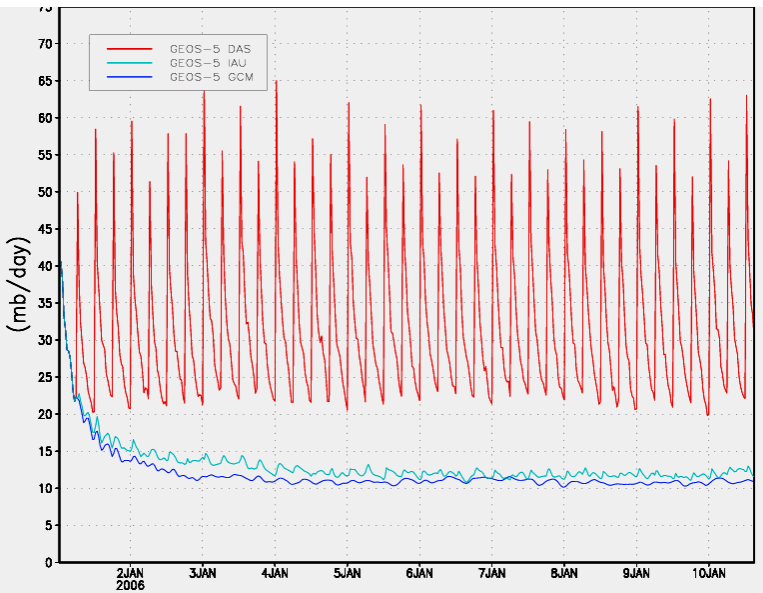
Model predicted change

Correction from the DAS



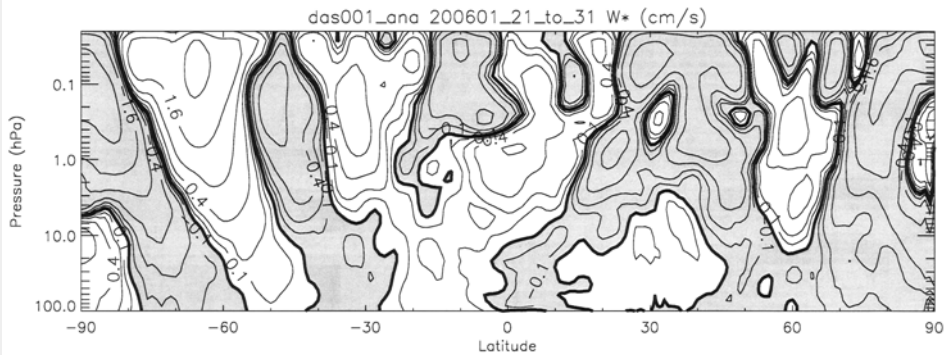
Impacts of IAU

Globally Integrated RMS Surface Pressure Tendency

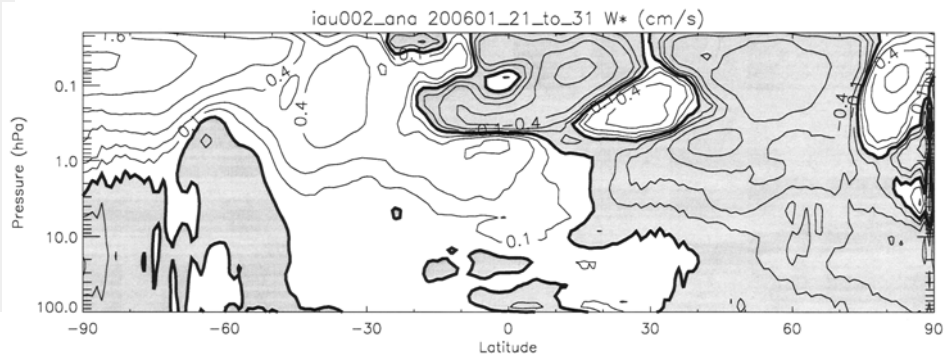


Residual Vertical Velocity

DAS w/o IAU



DAS with IAU



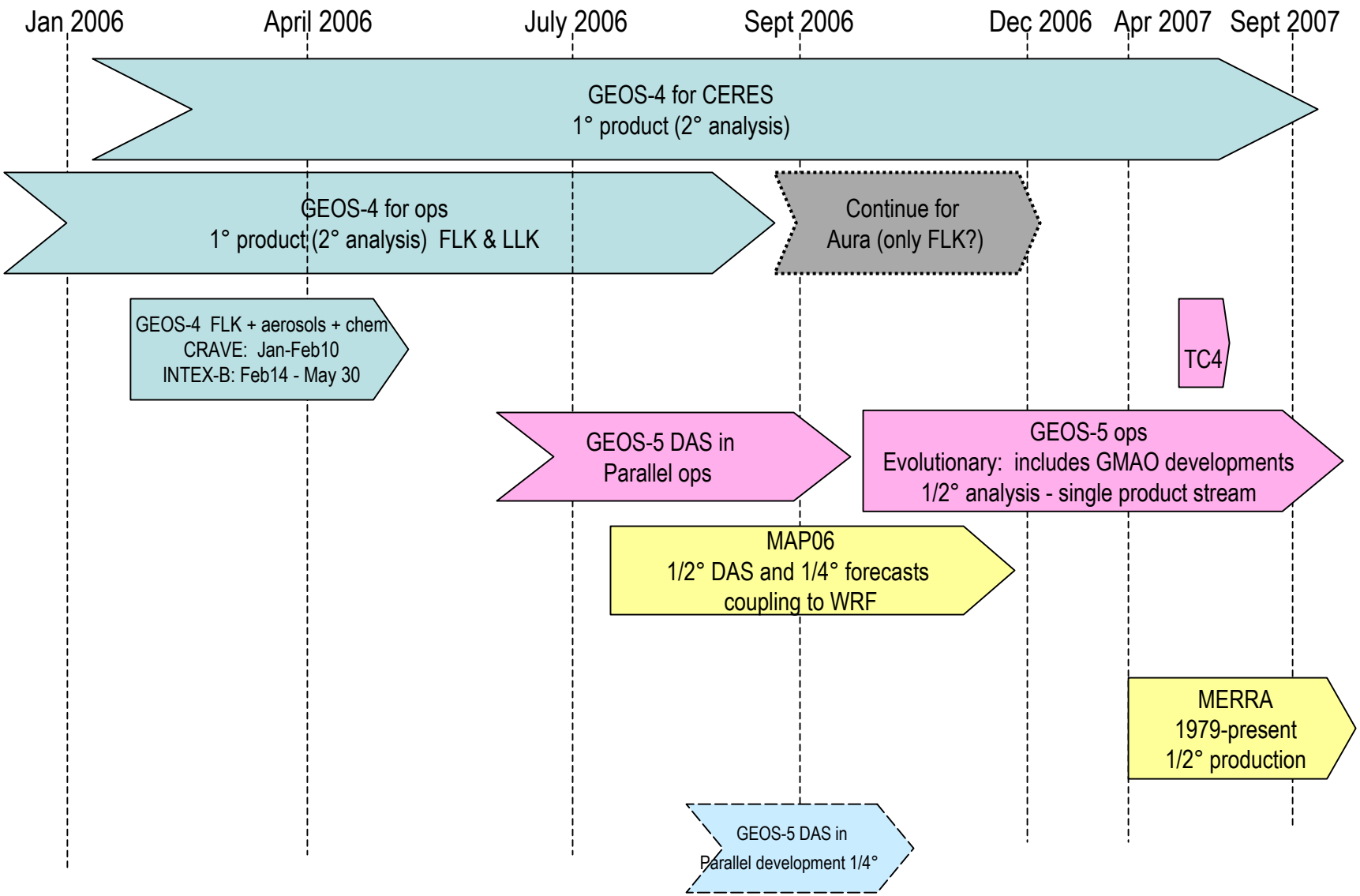
Issues Being Addressed

- Moisture
  - physics tuning in DAS mode
    - Tropical land precipitation has to be reduced
    - Extra-tropical storm track precipitation has to be increased
  - online model bias correction through the DAS
  - retrospective bias correction through the model for MERRA
- Precipitation data
  - more effective weighting
  - consistent data (GPROF rain rate)
- SSU data - continuity between instruments (adaptive bias correction should help)
- Radiosonde data homogenization - still deciding on path
- QC for PSC contamination of AIRS channels
- Tuning balance constraint statistics
- Surface temperature product (important for CERES)
  - currently just from the model, analysis could be from replay mode

Timeline for Operations

- August: finish current tuning
- Sept-Oct: validation for production system
- Nov: 2-degree spin-up sweep
- Dec/Jan: 1/2 degree MERRA validation runs + validation
- Feb/March: finalize; prepare for ops

Timeline for Operations



Summary of GEOS-5

- Developments:
  - Challenging, aggressive development
  - Major advances over GEOS-4
  - Aim for a documented, high-quality product
- Timeline:
  - Extensive validation in late 2006
  - Expect operational version in early 2007
  - High-quality data in late 2006